Annual Report of the ENMA Department

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Introduction

This report summarizes the development and tests on normal conducting magnets at the ENMA department.

FAIR Magnets

Magnets for HEBT

The purchasing of the normal conducting magnets of the High Energy Beam Transport system (HEBT) is separated in three batches. All specifications of batch one, including all dipoles for the HEBT, has been finished. The corresponding contract is ready for signature. The specifications of the two other batches are close to finalization.

Solenoid development

Various Solenoids must be developed for different machines of the FAIR-Project. A solenoid design environment (SDE) has been developed to reduce expenditure of design time and work. The design environment is based on an Opera-2D-comi file. Most significant physical and technical parameters of a solenoid are considered. Due to the rotational symmetry a two-dimensional solenoid model describes well the main characteristics of a real magnet.

The first application of the SDE was the designing of a solenoid for an emittance transfer experiment (EMTEX) at GSI. The 35 cm long magnet creates a flux density of 1 Tesla at the center. The coil system of the solenoid is separated in two halves to allow placing of a movable stripping foil on the beam axis. Still, the magnet design avoids a local flux minimum in the center, since it might act as a trap for electrons.

Figure 1: EMTEX-Solenoid. The stripping foil is placed at the center of the magnet.

The additional man power for the development of a SDE is expected to pay-off soon, as it will help to decrease development time significantly in the future.

Magnet system of an Ion Position Monitor (IPM) for SIS18

The magnetic system of a new Beam Diagnostic (BD) component for the SIS18 section has been designed. It consists of two steering and two diagnostic magnets, which allow to measures the transverse profile of an ion beam both vertically and horizontally. The sextupole harmonic was significantly reduced by a special arrangement of the coils.

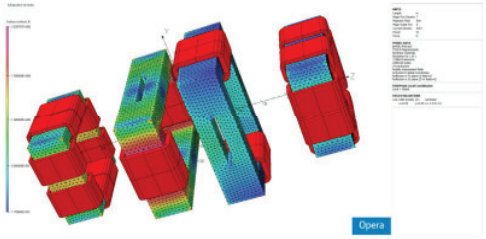

Figure 2: Opera-model of the magnet system of the IPM.

NC-Magnet Test Group

Magnetic measurements

The field distribution and quality of following magnets have been measured in the year 2012:

- 1 Electron spectrometer-quadrupole-triplet
- 1 Electron spectrometer-dipole
- 3 Quadrupole-triplets for the University of Frankfurt
- 1 LINAC-quadrupole-doublet

Other projects

- Development of a flexible research coil for dipole measurements. Several preliminary models have been designed and optimized. First parts of the mechanical integration have been designed.
- Optimization of the alignment device of the multipole measuring unit. An enlargement of the rotating coil system is in preparation.
- A procedure for demagnetizing of the mapper system was successfully developed and used.
- Installation of a ramping generator with corresponding software development and used.
- Handover of the stretched-wire--facility to the PBMT-department with training.
- Temperature measurements on a SIS18 quadrupole for reducing cooling water consumption with a new experimental water distribution system. A software for simulation of different operation modes has been developed.